

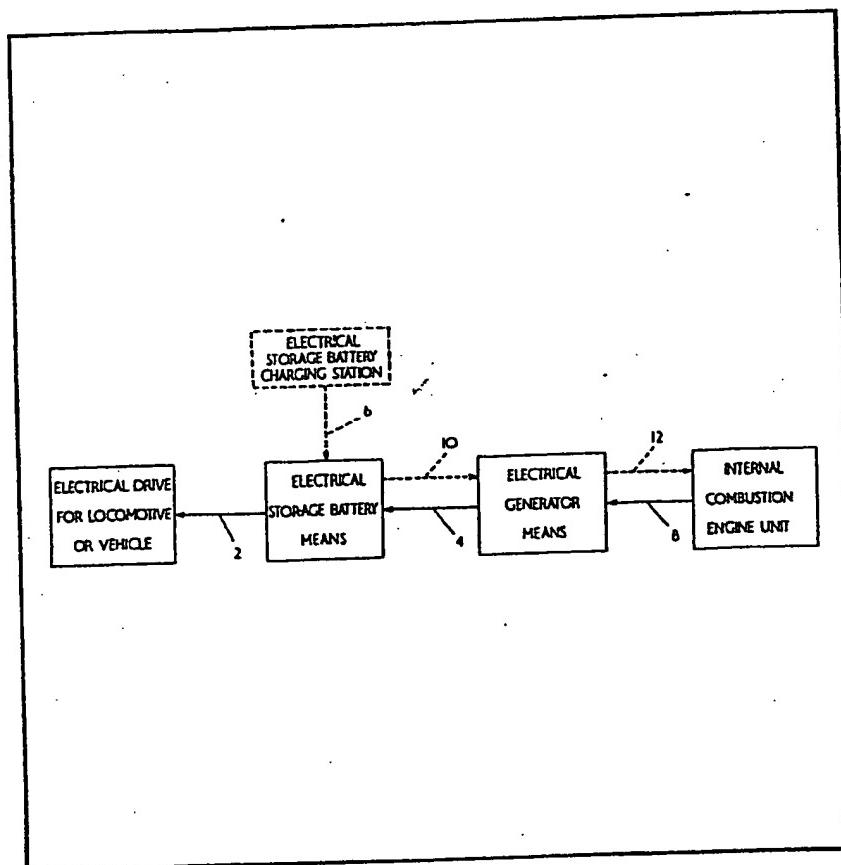
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## (54) Underground mine locomotives or vehicles

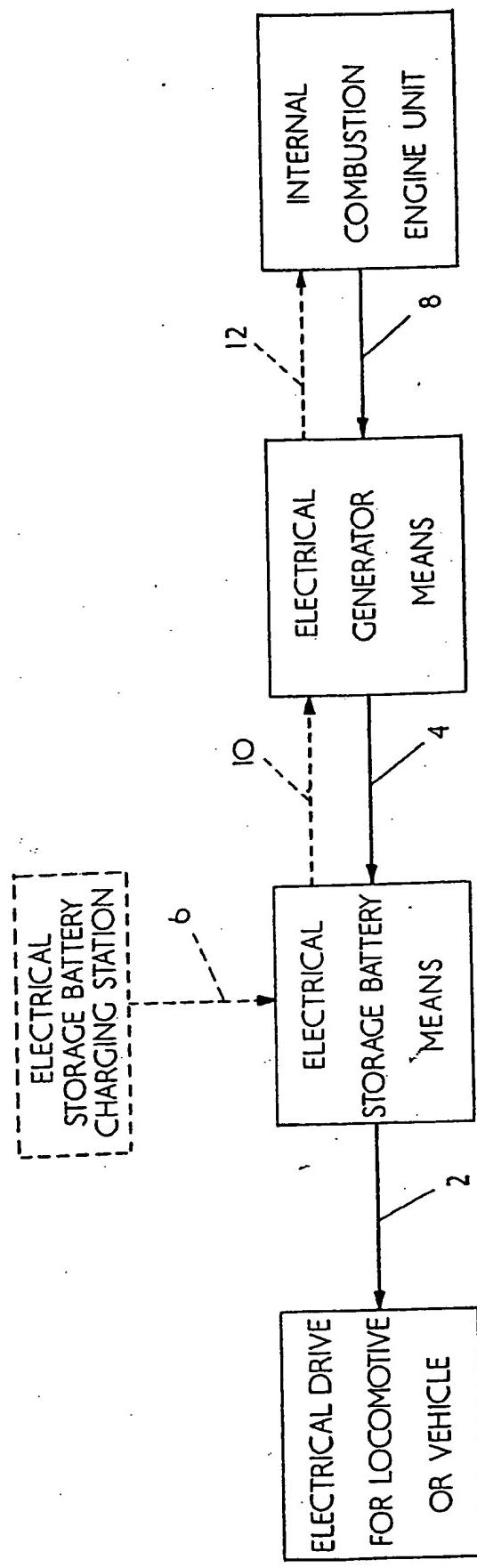
(57) An electric battery driven mine locomotive or vehicle is provided with a diesel engine unit and an electric generator driven by the engine which continuously recharges the battery, except when the engine is switched-

off manually or automatically in the vicinity of the coalface. The engine and generator are mounted on a tender connected to the locomotive or on a removable pallet so that they are readily detachable to facilitate servicing, repair or replacement. The generator is capable of functioning as a starter motor for the engine.



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## SPECIFICATION

## Underground Mine Locomotives or Vehicles

The invention relates to underground mine locomotive or vehicles and in particular to such locomotives or vehicles including electrical storage battery means and electrical drives deriving power from the electrical storage battery means.

Although the drive motor characteristics and substantially pollution free running conditions make such a locomotive or vehicle well suited to underground mine installations it does suffer from the disadvantage that the storage battery means provides only a limited range of travel before recharging is necessary.

It is because of this disadvantage that such locomotives or vehicles do not find wider application in underground mines and it is an object of the present invention to overcome or reduce the above mentioned disadvantage.

According to the present invention an underground mine locomotive or vehicle comprises electrical storage battery means, an electrical drive for the locomotive or vehicle arranged to derive its power supply from the electrical storage battery means, electrical generator means for generating and supplying electrical power to recharge the electrical storage battery means, and an internal combustion engine unit driveably connectible to the electrical generator means such that in use when the internal combustion engine unit is running it drives the electrical generator means which thereby supplies electrical power to the storage battery means which in turn supplies electrical power to drive the electrical drive to urge the locomotive or vehicle along.

Preferably, the internal combustion engine unit is detachable from the remainder of the locomotive or vehicle.

Conveniently, the electrical generator means is detachable along with internal combustion engine unit.

Conveniently, the electrical generator means is arrangeable to function as an electric motor driveable by power supplied from the electrical storage battery means to start the internal combustion engine unit.

Conveniently, the electrical storage battery means comprises a lead-acid battery and in which case the battery may be fitted with a catalytic converter to prevent discharge of inflammable gasses, for example, hydrogen.

Alternatively, the electrical storage battery means comprises a sodium-sulphur battery which does not discharge inflammable gases during recharging.

By way of example only, one embodiment of the present invention will be described with reference to the accompanying drawing which shows a diagrammatic layout of a locomotive or vehicle constructed in accordance with the present invention.

The drawing shows the underground mine

65 locomotive or vehicle to comprise an electrical drive for urging the locomotive or vehicle along. The drive includes an electric drive motor having driving characteristics suited to underground mine requirements and control equipment for

70 controlling the running of the locomotive or vehicle.

The electric drive motor is supplied with electrical power via line 2 from electrical storage battery means comprising a rechargeable storage 75 battery which, preferably, is rechargeable without the discharge of inflammable gases. Typically the storage battery means comprises a lead-acid battery and in which case the battery may be fitted with a catalytic converter to prevent discharge of inflammable gases, for example, hydrogen. Alternatively, the storage battery means comprises a sodium-sulphur battery which does not discharge inflammable gases during recharging.

85 Under normal running conditions the electrical storage battery means is continuously being recharged via line 4 from driven electrical generator means provided on the locomotive. However, the storage battery means also is

90 capable of being recharged via line 6 by an electrical storage battery charging station.

When the locomotive or vehicle is running normally the electrical generator means is driven continuously via shaft 8 by a detachable internal 95 combustion engine unit which typically comprises a diesel engine. The unit may be mounted on a tender connected to the remainder of the locomotive or vehicle. Alternatively, the unit is mounted on a removable pallet located on the 100 locomotive or vehicle. In either case the electrical generator means may be detachable along with the internal combustion engine unit.

The unit is made easily removable from the remainder of the locomotive or vehicle in order to 105 facilitate easy servicing, repair or replacement of the unit. It is envisaged that the usually relatively troublesome internal combustion engine unit will be simply detached from the remainder of the locomotive or vehicle and transported out of the 110 mine to the surface repair workshops.

It also is intended that the generator means will be capable of functioning as an electric motor so that during the starting of the internal combustion engine unit the generator means will 115 be driven by power supplied via line 10 from the storage battery means to start to drive the stationary internal combustion engine unit via shaft 12. Once the unit is running normally the generator would function normally and supply power to recharge the storage battery means via line 4.

The locomotive or vehicle will comprise control means, either manually operated or automatic for switching off the internal combustion engine unit 125 when desired, as for example when the locomotive or vehicle is approaching the vicinity of the working face in an underground coal mine where the operation of an internal combustion engine unit is not always desirable or allowed. In

such circumstances, the locomotive or vehicle would be driven by the power stored in the electrical storage battery means. However, it is envisaged that for a greater part of the running time of the locomotive or vehicle the internal combustion engine unit will be running. Consequently the size of internal combustion engine unit required will be smaller than would be the case where a unit is required to handle peak loadings.

#### Claims

1. An underground mine locomotive or vehicle comprising electrical storage battery means, an electrical drive for the locomotive or vehicle arranged to derive its power supply from the electrical storage battery means, electrical generator means for generating and supplying electrical power to recharge the electrical storage battery means, and an internal combustion engine unit driveably connectible to the electrical generator means such that in use when the internal combustion engine unit is running it drives the electrical generator means which thereby supplies electrical power to the storage battery means which in turn supplies electrical power to drive the electrical drive to urge the locomotive or vehicle along.

2. A locomotive or vehicle as claimed in Claim

- 30 1, in which the internal combustion engine unit is detachable from the remainder of the locomotive or vehicle.
  3. A locomotive or vehicle as claimed in Claim 2, in which the electrical generator means is detachable along with internal combustion engine unit.
  - 35 4. A locomotive or vehicle as claimed in Claim 1, 2 or 3, in which the electrical generator means is arrangeable to function as an electric motor driveable by power supplied from the electrical storage battery means to start the internal combustion engine unit.
  - 40 5. A locomotive or vehicle as claimed in any one of the preceding claims, in which the electrical storage battery means comprises a lead-acid battery.
  - 45 6. A locomotive or vehicle as claimed in Claim 5, in which the battery is fitted with a catalytic converter to prevent discharge of inflammable gases.
  - 50 7. A locomotive or vehicle as claimed in any one of the preceding claims 1 to 4, in which the electrical storage battery means comprises a sodium-sulphur battery which does not discharge inflammable gases during recharging.
  - 55 8. An underground mine locomotive or vehicle substantially described with reference to the accompanying drawing.

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